

英 語

問題冊子 2

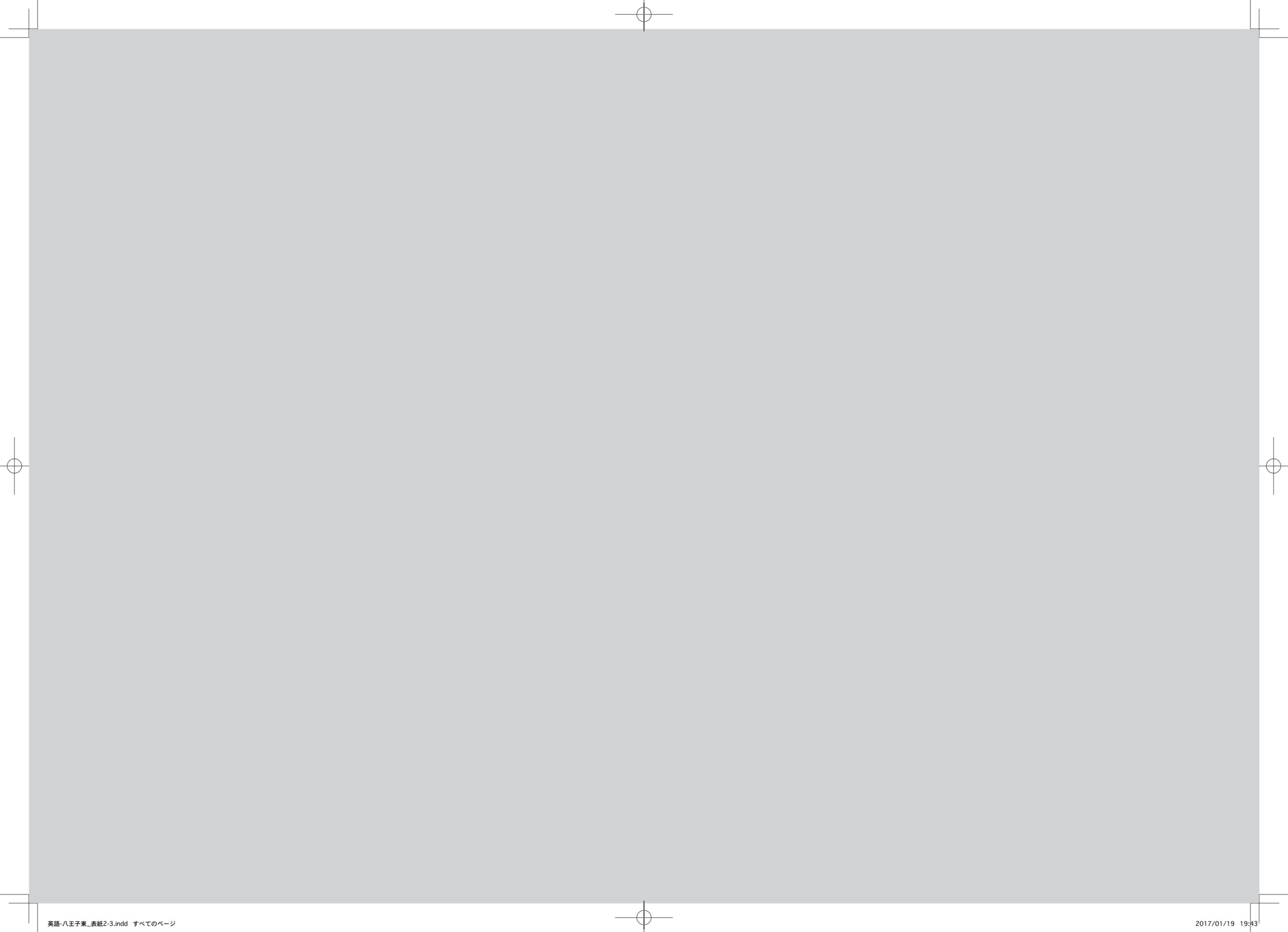
注 意

「問題冊子 2」に印刷されている問題は、**2** から **3** までで、2 ページから 13 ページまであります。

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〔問6〕 本文の内容と合っているものを、次のア～クの中から二つ選びなさい。

- ア Bubbles have different names for their size but they rise to the surface of water at the same speed.
- イ We know ultra-fine bubbles are in water because the water with them reflects special light and the water looks cloudy.
- ウ Fish grown in seawater with ultra-fine oxygen bubbles become larger than fish grown in normal seawater because they eat less and become more active.
- エ To keep fish fresh for a longer time, you need to put them in cold water filled with ultra-fine nitrogen bubbles for five minutes.
- オ A company says it can reduce 10% of the water which is necessary for cleaning if it uses ultra-fine bubble water without using detergents.
- カ By using water with ultra-fine bubbles, you can clean things because bubbles go between dirt and the surface of the things, burst there and take away dirt.
- キ In 2030, some people say the benefit from bubble technology in the world business may become about three times larger than the benefit in 2020.
- ク Many wonderful things were realized because scientists all over the world worked together to develop machines for producing ultra-fine bubbles.

〔問7〕 ⁽⁵⁾Do *advances in science and technology make us happier? とあるが、あなたはどのように思いますか。具体例を挙げて、あなたの意見を 40 語以上 50 語程度の英語で述べなさい。「,」「.」「!」「?」などは語数に含めません。これらの符号は、解答用紙の下線部と下線部の間に入れなさい。

2 次の対話の文章を読んで、あとの各問に答えなさい。
(*印の付いている単語・語句には、本文のあとに〔注〕がある。)

Yuri, a student from Japan, is studying at a high school in Canada. She is staying with Mary and her family. Mary and Yuri go to the same high school. They are working on a presentation at Mr. Brown's science class in the living room.

- Yuri: Mr. Brown said that we should use two key words, "global warming" and "*carbon" in our presentation.
- Mary: Yes, but it's difficult.
- Yuri: Well, ? We should learn what is happening around us first.
- Mary: Well, I visited a small town in the north with my friends several months ago. I saw some *tilted houses there.
- Yuri: Why were they tilted?
- Mary: Well, some people in the town said that the houses stood on the *permafrost. And the permafrost under those houses melted because it became warmer than before.
- Yuri: It's shocking. I think that is an example caused by . But why is the temperature getting higher?
- Mary: I'm not sure. Let's check studies about global warming to learn more about it.

Two hours later, Mary's younger brother, Oliver comes in.

- Oliver: Hi, what are you two doing?
- Yuri: Hi, Oliver, we ⁽³⁾【① for ② give ③ we ④ a presentation ⑤ preparing ⑥ will ⑦ are】 next week.
- Oliver: A presentation? What are you going to talk about?
- Mary: About global warming. "Why is the temperature getting higher?"
- Oliver: Wow, it's very difficult!
- Mary: Oliver, these days we have warmer days. That *is related to our activities.
- Oliver: Tell me more about it, Mary.
- Mary: We use electricity every day.
- Yuri: To make electricity, we burn *fossil fuels such as *coal, oil and gas. Then CO₂ is *released into the air.
- Mary: Oliver, I'm sure you have learned at school that CO₂ is a *greenhouse gas.
- Oliver: I don't remember.
- Mary: The *surface of the earth receives energy from the sun, and it releases the energy into the

air. CO₂ in the air *absorbs the energy released from the surface, and releases it back toward the surface. It warms the earth.

Oliver: Are you saying CO₂ is a bad thing?

Yuri: ⁽⁴⁾I don't think so. If there aren't greenhouse gases like CO₂ in the *atmosphere, the earth will become very cold.

Oliver: What will the temperature be without those gases?

Yuri: Scientists say it will be -19°C.

Oliver: Wow, that is very cold.

Mary: The *average temperature of the earth is about 14°C because of greenhouse gases. But if we have more and more CO₂ in the atmosphere, (1)-b ?

Yuri: Some people say sea level is going up because the temperature is becoming higher. Some towns or islands may be in the sea in the future.

Oliver: That's a big problem.

Mary: So we must not increase the *amount of CO₂. By the way, Oliver, did you turn off the light in the room when you got out of your room?

Oliver: I forgot it!

Mary: Don't leave the light on, Oliver.

Oliver: OK, Mary.

Mary and Yuri give their presentation about global warming and carbon in their science class.

Their presentation is coming to an end now.

Mary: Finally, ⁽⁵⁾look at this graph. We collected information from *NASA. This, as you see, shows the temperature *anomaly over about 120 years. The temperatures before 1930 are lower than the temperatures after 1970. Since 1970, the temperature has become higher and higher.

Yuri: Also, the amount of CO₂ increased little by little from 1800 to 1960. But after 1960 it *rapidly increased. We think it is related to our activities. Our daily lives have depended on fossil fuels more and more since 1960. So we must change our way of life. Thank you very much for listening.

After their presentation, Mary and Yuri are talking with their classmates, Tom and Kate in their classroom.

Tom: Your presentation was great.

Kate: I'm really impressed.

〔問3〕 ⁽²⁾this とあるが、その内容を最もよく表しているものは次の中ではどれか。

- ア Machines can produce more than one billion bubbles in 1 cc of water.
- イ To use bubbles with ozone is helpful to find a new way of curing diseases.
- ウ Scientists and doctors all over the world helped each other to cure diseases.
- エ Ozone bubbles are sent to disease germs and destroy them by bursting there.

〔問4〕 ⁽³⁾that とあるが、その内容を説明している 1 文を本文中から探して、その文の最初の 1 語と最後の 1 語を答えなさい。

〔問5〕 ⁽⁴⁾【① as ② do ③ in ④ easily as ⑤ washed ⑥ the ones ⑦ go bad ⑧ this water ⑨ not】とあるが、本文の流れに合うように、【 】内の単語・語句を正しく並べかえたとき、3 番目と 6 番目と 8 番目にくるものの組み合わせとして最も適切なものは次のア～カの中ではどれか。

	3 番目	6 番目	8 番目
ア	②	①	④
イ	④	⑤	⑧
ウ	⑦	①	⑤
エ	⑦	⑥	③
オ	⑧	⑦	④
カ	⑧	⑨	④

go bad after some time?" When science and technology develops, we always have to ask ourselves,
 “Do *advances in science and technology make us happier?”
 (5)

In the age of science and technology we may experience many more new advances. We have to think and decide by ourselves what is good and what is bad for the living things on the earth. The important thing is to continue asking questions. What do you think?

- [注] pump ポンプ normal 普通の reflect 反射する
 oyster farm 牡蠣の養殖場 ~ times ~倍 liter リットル
 surface 表面 burst はじける juicy 水分の多い
 germ 細菌 detergent 洗剤 dirt 汚れ
 scrub ~ off ~をこすり落とす extra 余分な cure 治療する
 ozone オゾン completely 全く side effect 副作用
 benefit 利益 trillion 兆 advance 進歩

[問1] 次の質問に対する適切な答えとなるように、They need に続けて [] に英語を補い、英文を完成させなさい。

(Question) How long do fish farmers need to grow *fugu* in normal seawater before selling them in a market?

(Answer) They need [] to do so.

[問2] [(1-a)], [(1-b)] の中に、それぞれ次の A~D のどれを入れるのがよいか。その組み合わせが最も適切なものは下のア~カの中ではどれか。

- A weaker B stronger C smaller D larger

	(1-a)	(1-b)
ア	A	C
イ	B	A
ウ	C	A
エ	C	B
オ	D	A
カ	D	B

Mary: Thank you very much.

Tom: In your presentation you said that plants absorb CO₂ and release O₂. If we plant many trees, they will absorb more CO₂, right?

Yuri: Yes, Tom, plants use CO₂, water, and energy from the sun when they grow, and then they make *carbohydrates.

Kate: That is necessary for life, isn't it?

Yuri: Yes.

Tom: You mean plants *store carbon in themselves in the *process.

Yuri: That's right. After plants die, they release CO₂ little by little.

Tom: I see.

Kate: I heard there are many dead trees in forests. Do they also release CO₂?

Yuri: Yes, forests store carbon and release it little by little.

Tom: Is there anything else that stores carbon?

Mary: Yes. We didn't talk about it, but permafrost stores carbon.

Kate: Permafrost?

Mary: Yes. There are many dead plants in the permafrost, but [(6)] because they are *frozen.

Kate: I see.

Mary: As you know, the temperature has become higher since 1970. Some people say the permafrost has begun to melt.

Kate: Really?

Yuri: We don't know how much carbon is stored in the permafrost, but one study shows that it is larger than the amount of carbon in the atmosphere.

Tom: Wow, I can't believe that. If the temperature continues to go up, the permafrost will melt and release CO₂. It will make the temperature of the atmosphere higher and higher.

Mary: (7) We are afraid that will happen.

Kate: You are right. We must do something to stop the permafrost from melting.

Tom: I didn't think our activities are related to global warming, but today from your presentation I have learned that it is really important to save energy in our daily life.

Yuri: I will tell my friends in Japan about the town in the north of Canada.

Mary: It is important for us to learn about this problem.

Tom: Yes. If we learn more, it will be the first step to solve this problem.

[注] carbon 炭素	tilted 傾いた	permafrost 永久凍土
be related to ~ ~と関連がある		fossil fuel 化石燃料
coal 石炭	release 放出する	greenhouse 温室効果の
surface 表面	absorb 吸収する	atmosphere 大気
average 平均	amount 量	NASA 米国航空宇宙局
anomaly 標準値と測定値の差		
(ここでは、1950～1980年の平均気温を標準値としている。)		
rapidly 急速に	carbohydrate 炭水化物	store 蓄える
process 過程	frozen 凍った	

[問1] (1-a), (1-b) の中に、それぞれ次のどれを入れるのがよいか。

- ア how shall we start
- イ why is it impossible
- ウ what will happen
- エ when is it possible

[問2] 本文の流れに合うように、(2) の中にどのような英語2語を入れるのがよいか。

[問3] (3) 【① for ② give ③ we ④ a presentation ⑤ preparing ⑥ will ⑦ are】とあるが、本文の流れに合うように、【 】内の単語・語句を正しく並べかえたとき、2番目と5番目と7番目にくるものの組み合わせとして最も適切なものは次のア～カの中ではどれか。

	2番目	5番目	7番目
ア	②	③	⑤
イ	②	④	⑦
ウ	②	⑤	⑦
エ	⑤	③	②
オ	⑤	④	③
カ	⑤	⑥	②

Scientists also found that ultra-fine bubbles filled with nitrogen, N₂, can stop *germs from increasing. Fish are now kept in cold water with nitrogen bubbles for about 10 minutes before they are sold in the market. You can keep fish fresh five times longer.

This technology is also very useful for cleaning. People use it to clean things such as cars, buses, trains, walls, bridges and so on. They use the power of bubbles to burst and do not need *detergents. They only use water with air bubbles. How does it work? Very small bubbles can easily go between *dirt and the surface of the things, and there they burst. When they burst, they take away dirt. You don't have to *scrub it off. And because you don't use detergents, you don't need *extra water to wash them away. In this way, you don't damage the environment. One company says it uses only 10% of the water needed before. And it spends only 70% of the time which was necessary before, the company adds.

Japanese scientists developed machines which can produce very small ultra-fine bubbles. They can produce more than one billion bubbles in 1 cc of water. Isn't it amazing? Scientists and doctors not only in Japan but also around the world are studying how to *cure diseases by using these very small bubbles. The idea is ⁽²⁾ this. They send bubbles with *ozone to disease germs. And when the bubbles reach the germs, the bubbles burst and destroy them. Doctors think this is a *completely new way of curing diseases. If you use the same medicine for a long time, germs become stronger and medicine doesn't work any more. But if you don't use medicine, you don't have to worry about ⁽³⁾ that or its *side effects. Doctors are excited because bubbles may be able to cure difficult diseases.

Ozone bubbles are also used by people in food business. They wash vegetables with ozone ultra-fine bubble water to protect them from germs. Vegetables ⁽⁴⁾ 【① as ② do ③ in ④ easily as ⑤ washed ⑥ the ones ⑦ go bad ⑧ this water ⑨ not】 washed in normal water. They can be fresh for a longer time in a store. And they taste better.

Many people believe this technology will bring larger *benefit in the coming years as its business grows larger. The benefit this business brought in 2010 was ¥126 billion, but some people say in 2020 it may bring ¥4.3 *trillion. In 2030, ¥12.67 trillion.

Ultra-fine bubbles have done many wonderful things. They don't damage the environment when people clean things. They grow fish and vegetables faster and make them larger. They can keep them fresh and delicious for a longer time. And they even give us hope to cure serious diseases. Some people call these bubbles "dream bubbles."

However, ultra-fine bubble technology just started at the beginning of the 21st century. We are not yet sure what kind of future this technology may bring to us. We have to ask ourselves, "Is it a good thing to grow fish or vegetables faster and make them larger?" or "Isn't it natural for food to

- 3 次の文章を読んで、あとの各問に答えなさい。
 (*印の付いている単語・語句には、本文のあとに〔注〕がある。)

Thanks to a new technology, you may not need shampoo any longer. This technology can produce very small bubbles. You see bubbles in many places in your daily life. When you keep pet fish at home, you often use a *pump to send air into water and you see bubbles there. Or when you drink cola, you see bubbles in the bottle. But the bubbles this technology can produce are different from these bubbles you see every day. They are very, very small. They even have different names for their size. A bubble that is less than 100 micrometers is called a fine bubble. A bubble that is less than one micrometer is called an ultra-fine bubble. One micrometer is 1/10,000 cm. Well, you can imagine how small they are, can't you?

These bubbles are so small that we cannot see them with our own eyes. Then, how do we know they are in water? The water with fine bubbles is not clear but cloudy. However, the water with ultra-fine bubbles is clear and looks just like *normal water. The bubbles in the water *reflect light only when we throw special light at the water, and then we know they are there. What is so special about these bubbles?

This technology started at an *oyster farm in Hiroshima in 2000. Some fish farmers found that they were able to grow an oyster bigger by sending very small air bubbles into the seawater. After that, other fish farmers used the seawater with oxygen, O₂, bubbles for growing fish. They found that fish in the seawater with ultra-fine oxygen bubbles became more active, ate more food, and grew larger and faster. *Fugu* grew up only in 14 months and were sold in a market. When they are grown in normal seawater, they need ten more months to grow up. In another farm, fish became 1.5 *times heavier after ten months than fish grown in normal seawater.

Why is this possible? The water with ultra-fine bubbles can hold more oxygen than normal water. Normal water holds 7.1 mg of oxygen in 1 *liter, while the water with ultra-fine oxygen bubbles holds 33.3 mg – about 5 times more.

Ordinary bubbles which are 1 mm quickly rise to the *surface of water and there they *burst. However, fine bubbles are smaller in size and rise to the surface very slowly. They rise only 3 mm in a minute. Ultra-fine bubbles are much (1)-a in size and their rising power to the surface is much (1)-b. So they do not rise. They stay in water for over six months.

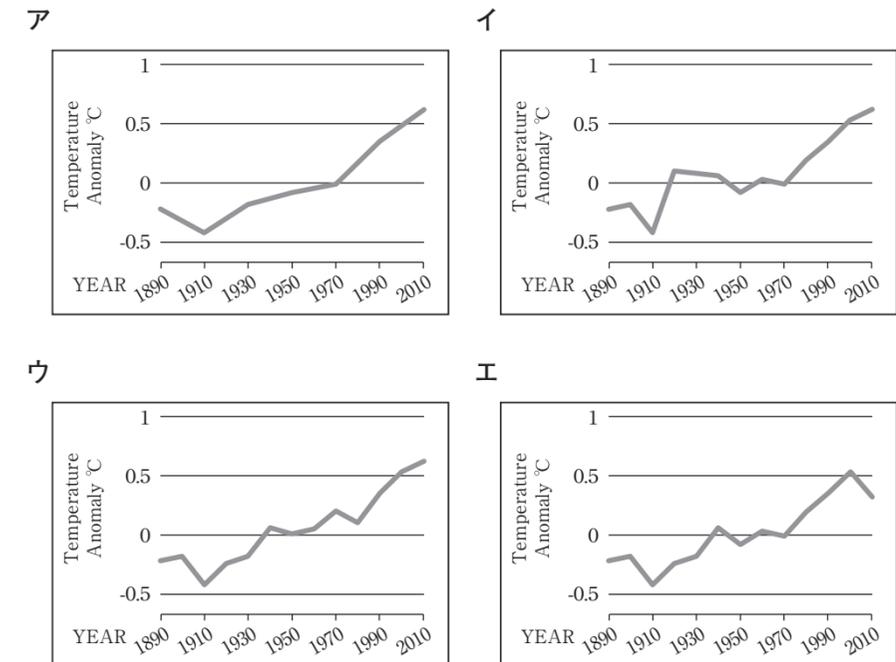
By using water with ultra-fine bubbles, scientists were able to grow larger tomatoes and *juicier strawberries. They were able to produce 10 – 20% more tomatoes and strawberries. They found water with ultra-fine bubbles can make very small living things in the earth more active. Because of this, plants can grow faster. Farmers are now using this technology.

- 〔問4〕 (4) I don't think so. とあるが、Yuri の考えを次のように書き表すとすれば、 の中に下のどれを入れるのがよいか。

CO₂ isn't a bad thing because .

- ア it keeps the temperature of the earth low
- イ it keeps the earth warm
- ウ it makes the atmosphere cold
- エ it makes the earth too warm

- 〔問5〕 (5) look at this graph とあるが、this graph の内容を正しく表しているのは次の中ではどれか。



- 〔問6〕 本文の流れに合うように、 (6) に英語を入れるとき、最も適切なものは次の中ではどれか。

- ア they use CO₂
- イ they absorb CO₂
- ウ they don't release CO₂
- エ they don't store CO₂

〔問7〕 We are afraid that will happen. とあるが、この文の内容を次のように書き表すとすれば、 の中に下のどれを入れるのがよいか。

We are afraid that .

- ア the permafrost will store carbon and the temperature will go up
- イ the permafrost will melt and the temperature will become higher
- ウ the temperature will not go up but the permafrost will melt
- エ the permafrost will melt and the temperature will go down

〔問8〕 本文の内容と合っているものを、次のア～クの中から二つ選びなさい。

- ア When Yuri visited a small town in the north with her friends several months ago, she saw some tilted houses there.
- イ CO₂ in the atmosphere releases the energy back to the sun, but it keeps the atmosphere warm.
- ウ The temperature of the earth will be 14℃ in 2020 because greenhouse gases like CO₂ absorb energy from the sun.
- エ Oliver turned off the light when he left his room and went into the living room.
- オ The amount of CO₂ has increased rapidly since 1960 because we have used more and more fossil fuels.
- カ Plants use only water and energy from the sun to store CO₂ in their bodies when they grow.
- キ The amount of carbon in the atmosphere is smaller than the amount of carbon stored in the permafrost.
- ク After Mary's presentation, Tom learned that their activities are not related to global warming at all.

このページには問題はありません。

次のページに進みなさい。